



Sidewall Sash

Catalog Section 1



Sidewall Sash

SECTION ONE
FOURTH EDITION
JUNE, 1920

Detroit Steel Products Company
Detroit, Michigan





Specifications

Steel Sash

Types and Sizes

All sash shall be the "Fenestra", made by the Detroit Steel Products Company, Detroit, Michigan.

All sash bars shall be made from solid rolled steel sections $1\frac{3}{8}$ inches deep. Not more than twenty per cent (20%) of the cross sectional area of both muntin bars shall be cut away at each intersection of the vertical and horizontal bars.

Ventilators

All ventilators shall be horizontally pivoted by means of external, adjustable, solid rolled steel butts, securely riveted through the sash bars and weathering. Double, flat contact weathering shall be used on all sides of the ventilators.

Operators and Fittings

All ventilators shall be provided with steel Z bar cam brackets. All ventilators accessible from the floor shall be provided with cam latches and solid rolled steel stay bars. All others shall be provided with cam latches, chain, chain catches and pulley brackets, except those that shall be controlled by mechanical operators.

Copper plated wire spring clips for glazing, together with all lugs, anchors, clips, etc., required for the installation of the sash shall be furnished by the sash contractor.

Mullions

Solid rolled steel T bar mullions shall be used between sash units when two or more occur in the same opening.

Painting

All sash shall be given one dip coat of red mineral paint before shipment.



*Factory and General Offices of the Detroit Steel Products Company
2250 East Grand Boulevard, Detroit, Michigan
Makers of the First Steel Sash Manufactured in America*

The Fenestra Line

	Catalog No.
Sidewall Sash	
Fenestra Pivoted Sash	1
Fenestra Pivoted Sash (As Inspected and La- beled under Supervision of Underwriters' Laboratories)	3
Fenestra Counterbalanced Sash	4
Fenestra Counterbalanced Sash (As Inspected and Labeled under Supervision of Under- writers' Laboratories)	3
Monitor Sash	
Fenestra Pivoted Sash	2
Fenestra Continuous Center Pivoted Sash	2
Fenestra Continuous Top Hung	2
Fenestra Horizontally Rolling	2
Mechanical Operating Devices	
Fenestra Worm and Gear Operator	2
Fenestra Continuous Operator	2
Fenestra Doors	5
Sliding Doors	
Hinged Doors	
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Fenestra Solid Rolled Steel Sections

94 SECTION

The standard outside bar for all sash. The long projecting leg of this section makes it particularly desirable for connection to various types of building construction and adds extra strength and stiffness to the sash.

90 SECTION

This section is used for interior muntin bars, both vertical and horizontal, for all FENESTRA sash. The vertical bar is punched for the FENESTRA joint and the horizontal bar is notched for locking.

70 SECTION

Ventilator Weathering member used as the bottom bar of ventilators. The long down-standing leg offers a perfect drip and protection against weather and adds extra stiffness at sill of ventilator.

71 SECTION

The reverse of 70 section. Used as the top bar of all standard FENESTRA ventilators.

84 SECTION

Weathering section used on the sash at the head of all standard FENESTRA ventilators. The long down-standing leg affords protection against driving storms.

85 SECTION

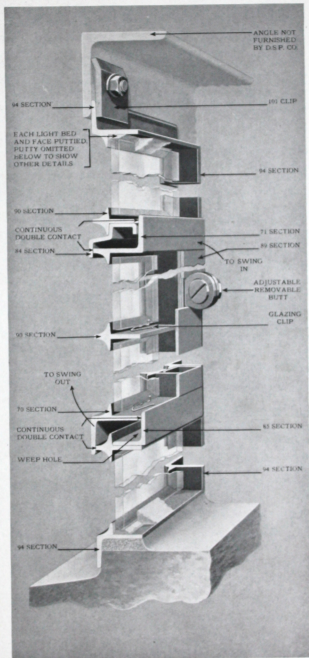
Used on the sash as a weathering section at the sill of standard FENESTRA ventilators.

89 SECTION

Used as a weathering section at both jambs of ventilators giving a two-point contact.

209 SECTION

A T-section for mullion purposes. This section used in conjunction with 94 Section at the jambs of units makes the most serviceable mullion construction that can be used. This mullion allows field adjustment, so that any small variation in masonry or steel openings can be satisfactorily taken care of. It is our standard construction and is urgently recommended for use in all openings.



This is a vertical section through a typical FENESTRA Stock unit. Note, particularly, the location of the various bars and their relation to each other; the application of bed and face putty; the unbroken line of double weathering; the method of attachment at the head and sill; the adjustable butt; the long down-standing leg of the 84 Section at the head of the ventilator and the 70 Section at the sill of the ventilator, protecting these important points from driving rain or snow. These details are standard on all stock sash.



How Fenestra Solid Steel Windows Are Designated

FOR the sake of brevity, certain letters have been chosen to represent certain glass sizes, as follows:

X stands for 10"x16" glass

Y stands for 12"x18" glass

Z stands for 14"x20" glass

P stands for 16"x22" glass

Every type of Fenestra sash is also designated by a number. The first digit at the left indicates the number of lights wide; the second digit the number of lights high; if the sash is ventilated, the third digit indicates the number of ventilators in the sash; the fourth digit the number of lights in each ventilator; the fifth digit the number of lights between the sill of the sash and the sill of the ventilator.

Thus a unit designated as Z-4181 means a unit requiring 14"x20" glass and 4 lights wide, 4 lights high, with one ventilator containing 8 lights of glass located with the sill of the vent one light above the bottom of the sash.

In sash having two ventilators, the location of the second ventilator is indicated by a sixth figure, thus: Z-472414 means a unit containing 14"x20" glass 4 lights wide; 7 lights high, containing two ventilators with 4 panes in each, lower ventilator being one light above the sill, and the upper ventilator 4 lights above the sill of the sash.

Classifications of Fenestra Sidewall Sash

Architects and engineers are urged to use "Warehouse Stock Sash" wherever possible. An ideal building from the standpoint of sash economy is one designed for Warehouse Stock Sash exclusively. If this cannot be done, use Warehouse Stock Sash wherever possible, and give Standard Sash the next preference. Use Semi-Standard and Special Sash only where absolutely necessary.

1. Warehouse Stock Sash ("Y" or 12"x18" glass and "Z" or 14"x20" glass exclusively). Certain popular types of Fenestra Solid Steel Windows have been standardized. These are made in quantities and kept in "Warehouse" at Detroit and in other cities ready to supply rush demand. They are made from standard material, are fully equipped and can be shipped quicker than any other windows. They answer all the usual building needs. (See detailed specifications on page 7.)

2. Standard Sash ("Y" or 12"x18" glass and "Z" or 14"x20" glass). For certain types of Fenestra sash, we have bars and ventilators in stock already machined, waiting to be made up. These we call our Standard Sash. (See detailed specifications on pages 8 and 9.)

3. Semi-Standard Sash ("Y" 12"x18", "Z" 14"x20" glass). These include all sash in "Y" and "Z" glass sizes 1, 8 and 9 panes high, and 1, 2 and 7 panes wide. Standard sash become semi-standard where it may be desired to have the ventilator pivoted at the top to open outward, or at the bottom to

open inward, or to be located other than as shown. Although bars and ventilators for semi-standard sash are carried in stock this type should be avoided if quick shipments are necessary. From a standpoint of price, semi-standard sash are far more desirable than other special types.

4. Special Sash, Class A. This class includes all sash in "X" (10"x16" glass and "P" 16"x22" glass), of the types given in the standard and semi-standard list. Neither bars nor ventilators are carried in stock and the entire sash must be made up special. They are, therefore, less desirable than warehouse sash, standard sash or semi-standard sash.

5. Special Sash, Class B. These include any extra sized or special sash which are not listed in any of the above classifications. These are not at all desirable and should not be ordered unless it is absolutely necessary.

6. Combination Glass Sizes. If any of the glass sizes are combined in other than the regular way (for instance "Y" or 12" width with a "P" or 22" height) a sash with combination glass size (12"x22") is formed. In a case of this kind, horizontal bars could perhaps be taken from stock, but the vertical bars would be special and ventilators would have to be assembled. The sash, therefore, would be less desirable than semi-standard sash, but more desirable than special sash. However, combination glass sizes are to be avoided if possible.



1—Fenestra Warehouse Stock Sash

2 PANES HIGH Y Height 3'1 1/2" Z Height 3'5 1/2"						
3 PANES HIGH Y Height 4'8" Z Height 5'2"						
4 PANES HIGH Y Height 6'2 1/2" Z Height 6'10 1/2"						
5 PANES HIGH Y Height 7'8 1/2" Z Height 8'6 1/2"						
6 PANES HIGH Y Height 9'3 1/2" Z Height 10'3 1/2"						
3 PANES WIDE Y Width 3' 2" Z Width 3' 8"						
4 PANES WIDE Y Width 4'2 1/2" Z Width 4'10 1/2"						
5 PANES WIDE Y Width 5'2 3/4" Z Width 6'0 3/4"						

Y=12" x 18" Glass. Combine Y Widths with Y Heights
Z=14" x 20" Glass. Combine Z Widths with Z Heights

Description

Type—Must be one of those shown above.

Bars—Continuous, with 94 Section all around, punched for connection to T-bar mullion. (See details on page 4.)

Glass Size—Either 12" x 18" or 14" x 20". Glass furnished only as an extra. Ventilator lights cut down. Lights abutting on top or sides trim 1" on abutting edge. Lights abutting on sill trim 1/8" on abutting edge. (See page 12.)

Butts—Solid rolled steel, external, adjustable. (See page 14.)

Weathering—FENESTRA Double Contact. (See page 15.)

Ventilators—Two panes high. Standard horizontally pivoted 2" above center.

Locking and Operating Devices—Cam latch and stay; cam latch, chain, and pulley bracket; spring catch, chain and pulley bracket. Shipped unattached. (See pages 16 and 17.) Cost of chain extra.

Mullion, if used—Standard T-Bar (209 Section)

this is the only type of mullion furnished. (See pages 5 and 18.)

Shipped—With FENESTRA standard hardware unattached, ventilators in place and wired shut. Heads of all ventilators punched for pulley bracket.

Glazing Clips—Copper Plated Wire, Spring Clips furnished with sash.

Erection Fittings—The following will be furnished where necessary without additional charge: Mullion bolts and nuts; Part 101 Clips and bolts; Wood screws when required; Angle Clips 1" x 1". Part No. 634. Angle clips, part 433 and rivets. (See details on page 21.)

Erection and Glazing Instructions—Furnished with each order.

Caution—In laying out a building use one glass size throughout—that is, Y heights with Y widths; Z heights with Z widths. Do not use some Y and some Z glass. Combinations of Y widths with Z heights, or vice versa, removes the sash from Warehouse classification.

2—Fenestra Standard Sash

Description

Type—Must be one of those shown below.

Bars—Continuous, with 94 Section all around punched for connection to T bar mullions. (See detail, page 18.)

Glass Size—12" x 18", or 14" x 20". Glass furnished only as an extra. Ventilator lights cut down. Lights abutting on top or sides trim 1" on abutting edge. Lights abutting on sill trim $\frac{3}{8}$ " on abutting edge. (See page 12.)

Butts—Solid rolled steel, external, adjustable. (See page 14.)

Weathering—FENESTRA double contact. (See page 15.)

Ventilators—Standard, two panes high, horizontally pivoted 2" above center.

Locking and Operating Devices—Cam latch and stay; cam latch, chain and pulley bracket; spring catch, chain and pulley bracket. Shipped unattached. (See pages 16 and 17.) Cost of chain for chain operation is extra.

Mullions, if used—Standard T bar, (209 Section.) This is the only type of mullion furnished.

Continued on next Page

2 PANES HIGH Y HEIGHT 3'-1 $\frac{5}{8}$ " Z HEIGHT 3'-5 $\frac{3}{8}$ "	 32 32160	 42 42140 42180
3 PANES HIGH Y HEIGHT 4'-8" Z HEIGHT 5'-2"	 33 33161	 43 43141 43181
4 PANES HIGH Y HEIGHT 6'-2 $\frac{3}{8}$ " Z HEIGHT 6'-10 $\frac{3}{8}$ "	 34 34161 34162	 44 44141 44142 44181 44182
5 PANES HIGH Y HEIGHT 7'-8 $\frac{3}{4}$ " Z HEIGHT 8'-6 $\frac{3}{4}$ "	 35 35161 35162	 45 45141 45142 45181 45182
6 PANES HIGH Y HEIGHT 9'-3 $\frac{1}{8}$ " Z HEIGHT 10'-3 $\frac{1}{8}$ "	 36 36161 36163 362614	 46 46141 46143 462414 46181 46183 462814
7 PANES HIGH Y HEIGHT 10'-9 $\frac{1}{8}$ " Z HEIGHT 11'-11 $\frac{1}{2}$ "	 37 37161 37164 372614	 47 47141 47144 472414 47181 47184 472814
3 PANES WIDE Y WIDTH 3'-2" Z WIDTH 3'-8"		4 PANES WIDE Y WIDTH 4'-2 $\frac{3}{8}$ " Z WIDTH 4'-10 $\frac{3}{8}$ "

Description—Continued

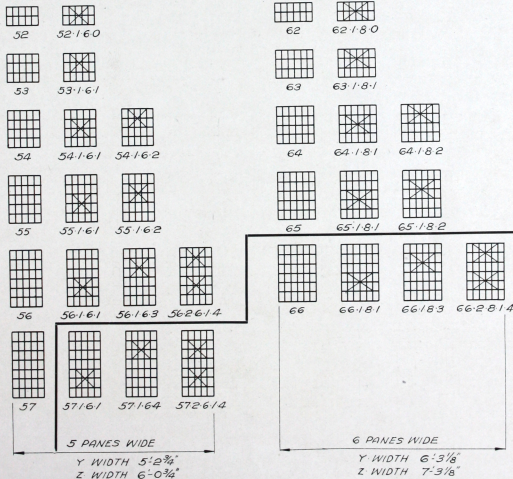
Glazing Clips—Standard copper plated wire spring clips furnished with sash.

Shipped—With fittings unattached; ventilators in place and wired shut; heads of all ventilators punched for pulley brackets.

Erection Fittings—The following will be furnished where necessary without additional charge: Mullion bolts and nuts; Part 101 clips and bolts; wood screws when required; Angle clips 1" x 1", part 634; Angle clips, part 433 and rivets.

Erection and Glazing Instructions—Furnished with each order.

CAUTION—In laying out a building use one glass size throughout; that is, Y heights with Y widths; Z heights with Z widths. Do not try to use some X, some Y and some Z glass. Combinations of this kind remove sash from Standard classification.



Types shown below the black rule are not recommended for use in 14" x 20" glass size.



Symmetrical Combinations of Warehouse and Standard Sash

* Indicates Warehouse Stock

Height Dimensions Warehouse and Standard Sash

12' x 18" Glass	14' x 20" Glass	No. Lts. in Height of Opening	No. Units High	No. Lights in Height of Units
* 3' 1 $\frac{3}{8}$ "	* 3' 5 $\frac{3}{8}$ "	2	1	2
* 4' 8"	* 5' 2"	3	1	3
* 6' 2 $\frac{3}{8}$ "	* 6' 10 $\frac{3}{8}$ "	4	1	4
* 7' 8 $\frac{3}{4}$ "	* 8' 6 $\frac{3}{4}$ "	5	1	5
* 9' 3 $\frac{1}{2}$ "	* 10' 3 $\frac{1}{2}$ "	6	1	6
10' 9 $\frac{1}{2}$ "	11' 11 $\frac{1}{2}$ "	7	1	7

Width Dimensions Warehouse and Standard Sash

The overall widths shown in any given column below can be had in any of the heights shown in the same column above

12' x 18" Glass	14' x 20" Glass	No. Lights in Width of Opening	No. Units Wide	No. Lights in Width of Units
* 3' 2"	* 3' 8"	3	1	3
* 4' 2 $\frac{3}{8}$ "	* 4' 10 $\frac{3}{8}$ "	4	1	4
* 5' 2 $\frac{3}{4}$ "	* 6' 0 $\frac{3}{4}$ "	5	1	5
6' 3 $\frac{1}{8}$ "	7' 3 $\frac{1}{8}$ "	6	1	6
* 6' 6"	* 7' 6"	6	2	3, 3
* 8' 6 $\frac{3}{4}$ "	* 9' 10 $\frac{3}{4}$ "	8	2	4, 4
* 9' 10"	* 11' 4"	9	3	3, 3, 3
* 10' 7 $\frac{1}{2}$ "	* 12' 3 $\frac{1}{2}$ "	10	2	5, 5
* 10' 10 $\frac{3}{8}$ "	* 12' 6 $\frac{3}{8}$ "	10	3	3, 4, 3
* 11' 10 $\frac{3}{4}$ "	* 13' 8 $\frac{3}{4}$ "	11	3	3, 5, 3
* 11' 10 $\frac{3}{4}$ "	* 13' 8 $\frac{3}{4}$ "	11	3	4, 3, 4
12' 8 $\frac{1}{4}$ "	14' 8 $\frac{1}{4}$ "	12	2	6, 6
* 12' 11 $\frac{1}{8}$ "	* 14' 11 $\frac{1}{8}$ "	12	3	4, 4, 4
12' 11 $\frac{1}{8}$ "	14' 11 $\frac{1}{8}$ "	12	3	3, 6, 3
* 13' 11 $\frac{1}{2}$ "	* 16' 1 $\frac{1}{2}$ "	13	3	4, 5, 4
* 13' 11 $\frac{1}{2}$ "	* 16' 1 $\frac{1}{2}$ "	13	3	5, 3, 5
* 14' 11 $\frac{3}{8}$ "	* 17' 3 $\frac{3}{8}$ "	14	3	5, 4, 5
14' 11 $\frac{3}{8}$ "	17' 3 $\frac{3}{8}$ "	14	3	4, 6, 4
* 15' 2 $\frac{3}{4}$ "	* 17' 6 $\frac{3}{4}$ "	14	4	3, 4, 4, 3
* 16' 0 $\frac{1}{4}$ "	* 18' 6 $\frac{1}{4}$ "	15	3	5, 5, 5
16' 0 $\frac{1}{4}$ "	18' 6 $\frac{1}{4}$ "	15	3	6, 3, 6
17' 0 $\frac{5}{8}$ "	19' 8 $\frac{5}{8}$ "	16	3	5, 6, 5
17' 0 $\frac{5}{8}$ "	19' 8 $\frac{5}{8}$ "	16	3	6, 4, 6
* 17' 3 $\frac{1}{2}$ "	* 19' 11 $\frac{1}{2}$ "	16	4	4, 4, 4, 4
18' 1"	20' 11"	17	3	6, 5, 6

See detailed explanation of this table on page 12.



Symmetrical Combinations of Warehouse and Standard Sash—Continued

* Indicates Warehouse Stock

12" x 18" Glass	14" x 20" Glass	No. Lights in Width of Opening	No. Units Wide	No. Lights in Width of Units
19' 1 3/8"	22' 1 3/8"	18	3	6, 6, 6
*19' 4 1/4"	*22' 4 1/4"	18	4	4, 5, 5, 4
19' 4 3/4"	22' 4 3/4"	18	4	3, 6, 6, 3
*20' 7 1/2"	*23' 9 1/2"	19	5	5, 3, 3, 3, 5
*21' 5"	*24' 9"	20	4	5, 5, 5, 5
21' 5"	24' 9"	20	4	4, 6, 6, 4
*21' 7 3/8"	*24' 11 3/8"	20	5	4, 4, 4, 4, 4
21' 7 3/8"	24' 11 3/8"	20	5	3, 4, 6, 4, 3
*22' 8 1/4"	*26' 2 3/4"	21	5	4, 4, 5, 4, 4
*22' 8 3/4"	*26' 2 3/4"	21	5	3, 5, 5, 5, 3
22' 8 3/4"	26' 2 3/4"	21	5	3, 6, 3, 6, 3
23' 5 3/4"	27' 1 3/4"	22	4	5, 6, 6, 5
23' 8 5/8"	27' 4 5/8"	22	5	4, 4, 6, 4, 4
*23' 8 5/8"	*27' 4 5/8"	22	5	4, 5, 4, 5, 4
23' 8 5/8"	27' 4 5/8"	22	5	3, 5, 6, 5, 3
*23' 11 1/2"	*27' 7 1/2"	22	6	3, 4, 4, 4, 4, 3
*23' 11 1/2"	*27' 7 1/2"	22	6	3, 3, 5, 5, 3, 3
*24' 9"	*28' 7"	23	5	4, 5, 5, 5, 4
24' 9"	28' 7"	23	5	3, 6, 5, 6, 3
25' 6 1/2"	29' 6 1/2"	24	4	6, 6, 6, 6
25' 9 3/8"	29' 9 3/8"	24	5	3, 6, 6, 6, 3
25' 9 3/8"	29' 9 3/8"	24	5	4, 5, 6, 5, 4
*26' 0 1/4"	*30' 0 1/4"	24	6	4, 4, 4, 4, 4, 4
*26' 0 1/4"	*30' 0 1/4"	24	6	3, 4, 5, 5, 4, 3
*26' 9 3/4"	*30' 11 3/4"	25	5	5, 5, 5, 5, 5
27' 10 1/2"	32' 2 1/2"	26	5	5, 5, 6, 5, 5
*28' 1"	*32' 5"	26	6	4, 4, 5, 5, 4, 4
*28' 1"	*32' 5"	26	6	3, 5, 5, 5, 5, 3
28' 1"	32' 5"	26	6	3, 4, 6, 6, 4, 3
28' 10 1/2"	33' 4 1/2"	27	5	5, 6, 5, 6, 5
29' 10 7/8"	34' 6 7/8"	28	5	5, 6, 6, 6, 5
*30' 1 3/4"	*34' 9 3/4"	28	6	4, 5, 5, 5, 5, 4
30' 1 3/4"	34' 9 3/4"	28	6	3, 5, 6, 6, 5, 3
30' 11 3/4"	35' 9 3/4"	29	5	6, 6, 5, 6, 6
31' 11 5/8"	36' 11 5/8"	30	5	6, 6, 6, 6, 6
*32' 2 1/4"	*37' 2 1/4"	30	6	5, 5, 5, 5, 5, 5

See detailed explanation of this table on page 12.

How to Use the Table of Symmetrical Combinations of Warehouse and Standard Sash

SUPPOSE you have a window opening seven feet high by approximately 18 feet 6 inches wide, to be filled with sash. You want to know the number of units needed, their height, width and the number of mullions necessary.

You would, of course, prefer to use 14" x 20" glass, because the bigger the glass size, the less the cost of the sash per square foot.

You refer, first, to your height dimension table and look down the column headed "14" x 20" Glass." There you find a height of 6' 10³/₈" which is probably close enough to seven feet to serve your purpose. On a parallel line, in the next column to the right, you find the figure 4, indicating that a sash 6' 10³/₈" high will be four lights high.

You next come to the width dimension and you continue in the 14" x 20" Glass column as before. You readily find a width dimension of 18' 6¹/₄", and opposite this figure, in the column at the right, you find the number 15. This means that the bay of sash, when complete, will be 15 lights wide. In the next column to the right, the figure 3 indicates that you will need three units of sash and therefore two mullions to join them together. The third column at the right gives the figures 5, 5, 5, which indicates that each of the units will be five panes wide. If desirable, the combination just below, 6, 3, 6, can be used. To fill your opening, therefore, you will need three units of sash, glass size 14" x 20", each sash four lights high by five lights wide. You will need, also, two mullions, but 18' 6¹/₄" dimension includes the mullions.

Suppose that instead of 14" x 20" glass, you had selected 12" x 18" glass. In that case, your height dimension would have been either 6' 2³/₈" or 7' 8³/₄", and your width dimension, in the same glass size, would be 18' 1".

In using this table, it is necessary to pick your height dimension and your width dimension from the same column; that is, keep them in the same glass size. Do not try to use the height dimension shown in one column with the width dimension shown in another, as doing so makes a sash of combination glass size.

Try also to use the same glass size throughout your entire building. The use of different glass sizes in different bays results in complicated erection and glazing.

In using this table, keep in mind that the starred dimensions in either the 14" x 20" column or the

12" x 18" column refer to **warehouse** stock sash, but if you find it necessary to use dimensions that are not starred, you automatically change to **standard** sash.

After you have determined the size and type of units desirable, turn back to the types shown on pages 7 and 8, and pick out the units you desire ventilated.

Not all of the possible combinations shown in the preceding table are to be recommended. Check all such combinations by the warehouse and standard types on pages 7, 8 and 9. Ventilated sash six panes wide and six panes high, or five panes wide by seven panes high, or any sash of dimensions larger than these, are not recommended in 14" x 20" glass. (See foot note, page 9)

Size and Location of Ventilators

The size and location of ventilators in Warehouse and Standard Sash must conform to the arrangements shown on pages 7, 8 and 9. Any other arrangement, size or location takes the sash out of Warehouse and Standard classification.

Size of Ventilator Lights

In glazing FENESTRA Warehouse and Standard Stock units it is well to keep in mind that the outside lights in FENESTRA ventilators must be somewhat smaller than the other lights of the sash. Ventilator lights

12" X 18"	12" X 18"	12" X 18"	12" X 18"
11" X 17"	12" X 17"	12" X 17"	11" X 17"
11" X 17 ⁵ / ₈ "	12" X 17 ⁵ / ₈ "	12" X 17 ⁵ / ₈ "	11" X 17 ⁵ / ₈ "
12" X 18"	12" X 18"	12" X 18"	12" X 18"

which abut on the top or side must be trimmed 1" along the abutting edge. Ventilator lights which abut on the sill must be trimmed ³/₄ of an inch on the abutting edge. (See drawing above.)



Five Essentials of Steel Sash Construction

The experience of successful architects and engineers proves there are five main essentials of steel sash:

- 1—Sufficient strength at the joint.
- 2—Strongly attached and well weathered butts.
- 3—Weathering constructed to effectively resist storms.
- 4—Fittings that stay on and provide ready and efficient operation.
- 5—Strong mullions—weather resisting and easy to erect.

How thoroughly FENESTRA WindoWalls measures up to each of these requirements is shown below and on the following pages.

1—Thirty Percent More Strength at the Joint

The FENESTRA joint is a patented interlocking of vertical and horizontal bars which permits them to run continuously from head to sill and from jamb to jamb. This interlocking method retains 30% more steel than any other method of joining and gives the sash maximum strength against wind pressure and wind suction.

The machine-cut bars fit together with an absolutely tight and weatherproof union which makes welding unnecessary and reduces to a minimum the opportunity for corrosion.

The graceful outward curve of the vertical muntin at the interlocking point increases the beauty of the sash and provides a guard which guides water away from the joint.



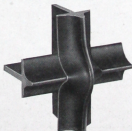
Horizontal bar with notch cut for locking wing.



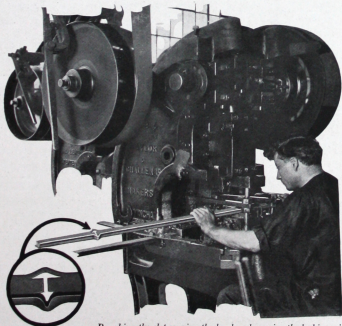
Vertical bar with metal removed.



Horizontal bar slipped through vertical bar. Note locking wing ready to fit into notch in horizontal bar.



Completed Fenestra joint with locking wing in place.



Punching the slot curving the head and opening the locking wing in the vertical muntin.

2—Rigidly Attached, Weatherproof Butts

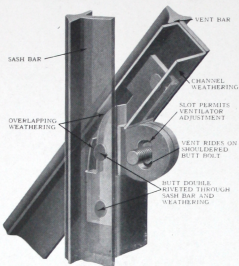


Fig. 1

ALL ventilators are horizontally pivoted 2" above center, by means of two external, adjustable, solid steel butts. Each butt is composed of two members, one member being attached to the jamb bar of the ventilator and the other to the adjacent bar of the sash. These members are given unusual supporting strength by being double riveted through both weathering and sash bars.

Each section of the butt has a projecting "ear" which extends beyond the plane of the sash. Through these "ears" the butt bolt is passed, giving a pivot that is external and therefore easily accessible. (See Fig. 1.)

Easily Adjusted Up or Down

A slot in the projecting "ear" of the butt member attached to the sash permits easy adjustment up or down and the ventilator can be lifted from the sash entirely by merely removing the butt bolts.

The butt bolt itself is provided with a shoulder on which the ventilator turns. Its lower part is threaded to receive a nut for the purpose of tightening the butt after adjustment has been made.

The construction of the butt members is such that an aperture is left, through which condensation at the upper part of the ventilator follows the weathering

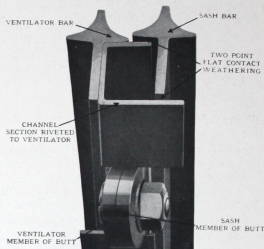


Fig. 2

down to the sill and escapes outward through the weep holes.

The butt is protected against driving storms by overlapping weathering. As the ventilator closes, the weathering on the movable section fits down half an inch over the weathering on the fixed section, forming an overlap which sheds water and gives surface contact. (See Fig. 2.)

In the early days of steel sash manufacture it was customary to hang the ventilators by means of a strap hinge, attached by rivets to the weathering members on the sash and on the ventilator. This was unsatisfactory because it necessitated a heavy weathering section and because the weight of the ventilator when open placed the butt rivets under heavy tension.

FENESTRA engineers, by designing a butt with a projecting ear, made possible two improvements:

- 1st—The new design permitted the riveting of each butt member through *both weathering and sash bar*, thus insuring a sturdy and durable attachment.
- 2nd—It permitted the use of springy steel channel weathering, which insures tight contact of the ventilator against the sash, as described on the following page.

3—Effective Ventilator Weathering

In designing steel members that form a contact where no friction occurs, engineers consider straight edges and flat surfaces as the most effective method of weathering.

Fenestra ventilators are built in strict accordance with this well recognized principle, the various Fenestra bars used at the head, jams and sill being so assembled, that as the ventilator closes, two flat surfaces on the ventilator come into actual and positive contact with two flat surfaces on the sash.

This gives two point, flat contact weathering all around the ventilator.

At the head and sill (Figs. 3 and 5) where extra heavy sections are used to strengthen the vents and prevent sagging, the weathering members have a long leg extending downward to form a perfect drip and effectually shield the top and bottom of the ventilator from driving storms.

Further protection at the top is given by the formation of the weathering section, which is curved downward on the inside of the sash to form a lip, which acts as a baffle to air currents.

At the jams the heavy rolled channel section frequently used by steel sash manufacturers has been replaced by a springy steel channel which is drawn tight against the sash bar by the action of the cam latch at the sill and is really "sprung" into flat contact when the ventilator is locked. (Fig. 4.)

At the butt the weathering members are so constructed that the upper portion completely overlaps the lower portion when the ventilator is closed.

One of the greatest difficulties that steel sash manufacturers have encountered has been leakage at the sill from moisture which condenses inside the weathering.

To guard against difficulty of this kind, the new Fenestra weathering provides an angle section at the sill, the ends of which are bent at right angles so that no aperture is left at the lower corners of the weathering. Water, instead of seeping through into the building, is guided toward the exterior and escapes through weep holes cut through the sill bar of the sash near the jams. (Fig. 6.)

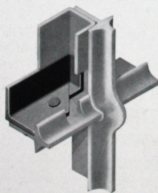


Fig. 6

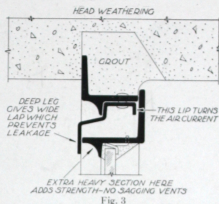
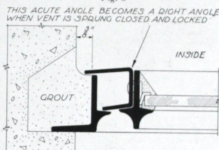
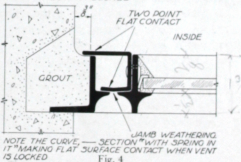


Fig. 3



EXAGGERATED DRAWING OF JAMB WEATHERING SHOWING VENTILATOR CLOSED BUT NOT LOCKED



JAMB WEATHERING NOTE THE CURVE, SECTION WITH SPRING IN IT MAKING FLAT SURFACE CONTACT WHEN VENT IS LOCKED

Fig. 4

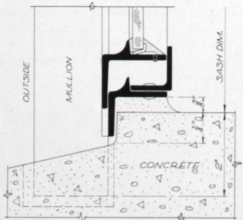


Fig. 5

4—Durable and Easily Operated Hardware

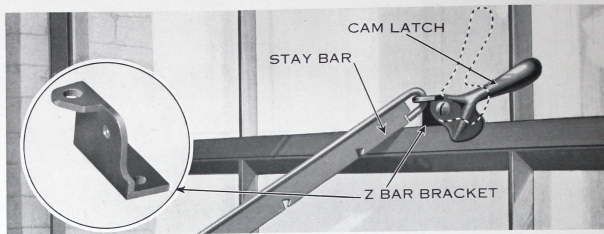


Fig. 1

The Fenestra Cam Latch

Engineers and architects have demanded a self operating and fool proof method of locking ventilators in place. This demand has been supplied in the Fenestra cam latch (part 467), which is of pleasing design, strong and substantial, and is attached to a solid rolled Z bar bracket which is securely riveted to the bottom rail of the ventilator.

In closing the ventilator—the cam latch rides up over the weathering and falls inside, locking the window.

The Z Bar Bracket

Fenestra operating hardware is attached to the ventilator by the Z bar bracket. This is a solid steel section rolled with a fillet in each corner which gives it double thickness at this point and, therefore, greater strength than can be obtained in any other way. The bracket is securely attached to the bottom section of the ventilator by means of three rivets and cannot work loose. It is punched for either of

the standard operating devices shown in Figures 2 and 3, following page.

Operating Single Ventilators

For the operation of single ventilators, two methods have been standardized.

Cam Latch and Stay Bar

Figure 2—Cam Latch and Stay is supplied as standard on Fenestra Sidewall Sash. It is to be used only where the bottom of the ventilator is within easy reach of the floor. To open the ventilator, the cam latch is lifted by the right hand, while the left hand pushes the stay outward until one of the notches along its lower edge engages the weathering at the bottom of the ventilator. The stay bar permits a maximum opening of the window of approximately 90 degrees. When the ventilator closes, the stay hangs in a vertical position close to the sash or can be placed across the cam handle in a horizontal position.

Cam Latch and Chain Operator

Figure 3—Cam Latch and Chain supplied when specified on Fenestra Standard Sash (chain cost extra) where ventilators are some distance above the floor. The chain extends from the handle of the cam latch over a pulley at the top of the ventilator down to within easy reach and back to the handle of the cam latch again.

A slight pull releases the cam latch and at the same time pulls the ventilator open. A chain cleat (supplied without extra charge) fastened to the sash or to the wall below the window, engages the chain and holds the ventilator open at any desired angle.

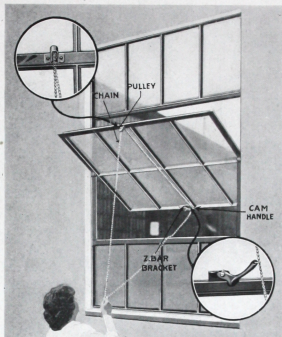


Fig. 3

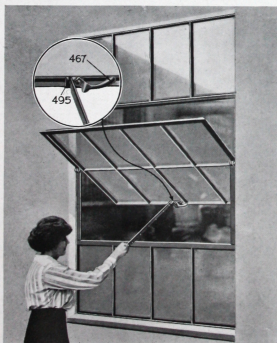


Fig. 2

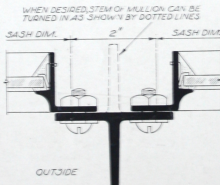
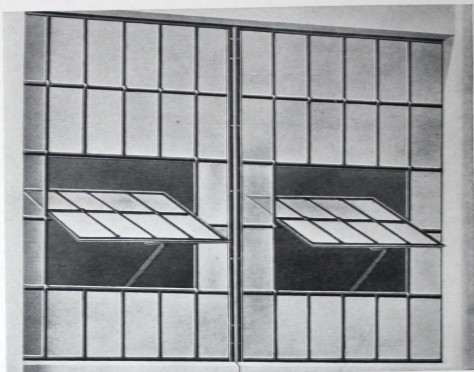
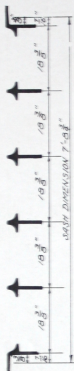
Operating Double Ventilators

There are two methods for operating the upper ventilators in sash with double ventilators.

1. Mechanical Operator. Worm and Gear Operator is recommended where there are several ventilators to be operated simultaneously in the same bay or where there are several bays of sash to be operated. When this is specified, the sash are equipped for its attachment without extra charge or delay.

2. Cam Latch and Chain Operator. This method of operation has been described above. See Figure 3.

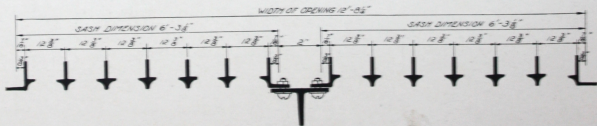
5—Strong, Easily Erected Mullions



Two or more units of FENESTRA sash may be combined in the same opening by joining them with our T bar mullion as shown here. Absolute weather resistance is assured because of the wide, flat contact between the mullion and the sash—a lap of 1". Strength is provided in two directions, an adequate guard against bending or distortion. Erection is made easy. Just place the sash side by side—bolt the mullion between. Bolts are accessible—sash easily removed.

The vertical and horizontal cross sectional drawings show details and dimensions of an opening in which two Y65181 were used. The photograph shows these sash as they looked after installation in the plant of the Muskegon Piston Ring Co., Muskegon, Michigan.

Detail of the mullion and its connection to jamb bars of the sash is shown at the left.

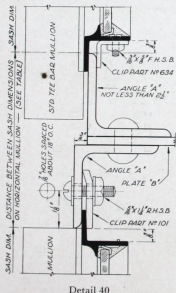




Horizontal Mullion Construction

FOR openings of any width where it is desirable to use one sash immediately above another, we recommend a horizontal mullion which can easily be secured in the field to meet any given condition.

This mullion is not furnished by the Detroit Steel Products Co. The information is given merely as a guide to designers and builders. The drawing below shows how the mullion is built up and the table shows overall widths of mullion necessary for varying combinations of sash—also the size of angles, plate (where used) estimated weight of mullion and distance between sash dimension points.



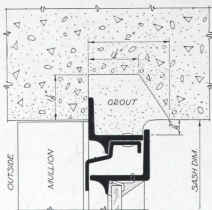
Detail 40

Table of Horizontal Mullion Details

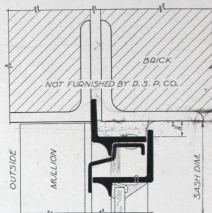
Lights Wide	Lights in Each Unit	Overall Width Using Mullion Sections No. 109 or 309	ANGLES "A"		PLATE "B"	Estimated Weight of Mullion Per Foot	Distance Between Sash Dimensions on Horiz. Mullion
			No.	Size			
"Y"—12" x 18" Glass							
6	3-3	6' 6"	2	2½" x 2½" x ⅜"	None	6.2 lbs.	5"
8	4-4	8' 6¾"	2	2½" x 2½" x ⅜"	None	6.2 lbs.	5"
9	3-3-3	9' 10"	2	2½" x 2½" x ⅜"	None	6.2 lbs.	5"
10	5-5	10' 7½"	2	2½" x 2½" x ⅜"	None	8.2 lbs.	5"
..	3-4-3	10' 10¾"	2	2½" x 2½" x ⅜"	None	8.2 lbs.	5"
11	3-5-3	11' 10¾"	2	2½" x 2½" x ⅜"	4" x ⅜"	8.75 lbs.	5¾"
..	4-3-4	11' 10¾"	2	2½" x 2½" x ⅜"	4" x ⅜"	8.75 lbs.	5¾"
12	6-6	12' 8¾"	2	2½" x 2½" x ⅜"	5" x ⅜"	9.38 lbs.	5¾"
..	4-4-4	11' 11½"	2	2½" x 2½" x ⅜"	5" x ⅜"	9.38 lbs.	5¾"
..	3-6-3	12' 11½"	2	2½" x 2½" x ⅜"	5" x ⅜"	9.38 lbs.	5¾"
13	4-5-4	13' 11½"	2	2½" x 2½" x ⅜"	6" x ⅜"	10.0 lbs.	5¾"
..	5-3-5	13' 11½"	2	2½" x 2½" x ⅜"	6" x ⅜"	10.0 lbs.	5¾"
14	5-4-5	14' 11½"	2	2½" x 2½" x ⅜"	6" x ¼"	11.3 lbs.	5¾"
..	4-6-4	14' 11½"	2	2½" x 2½" x ⅜"	6" x ¼"	11.3 lbs.	5¾"
15	5-5-5	16' 0¾"	2	2½" x 2½" x ⅜"	6" x ⅜"	12.1 lbs.	5¾"
..	6-3-6	16' 0¾"	2	2½" x 2½" x ⅜"	6" x ⅜"	12.1 lbs.	5¾"
16	5-6-5	17' 0¾"	2	2½" x 2½" x ⅜"	6" x ¼"	13.3 lbs.	5¾"
..	6-4-6	17' 0¾"	2	2½" x 2½" x ⅜"	6" x ¼"	13.3 lbs.	5¾"
17	6-5-6	18' 1"	2	3" x 3" x ¼"	6" x ⅜"	13.6 lbs.	6¾"
18	6-6-6	19' 1¾"	2	3" x 3" x ¼"	6" x ¼"	14.9 lbs.	6¾"
"Z"—14" x 20" Glass							
6	3-3	7' 6"	2	2½" x 2½" x ⅜"	None	6.2 lbs.	5"
8	4-4	9' 10¾"	2	2½" x 2½" x ⅜"	None	6.2 lbs.	5"
9	3-3-3	11' 4"	2	2½" x 2½" x ⅜"	4" x ⅜"	8.7 lbs.	5¾"
10	5-5	12' 3½"	2	2½" x 2½" x ⅜"	5" x ⅜"	9.39 lbs.	5¾"
..	3-4-3	12' 6¾"	2	2½" x 2½" x ⅜"	5" x ⅜"	9.39 lbs.	5¾"
11	3-5-3	13' 8¾"	2	2½" x 2½" x ⅜"	6" x ⅜"	10.03 lbs.	5¾"
..	4-3-4	13' 8¾"	2	2½" x 2½" x ⅜"	6" x ⅜"	10.03 lbs.	5¾"
12	6-6	14' 8¾"	2	2½" x 2½" x ⅜"	6" x ¼"	11.3 lbs.	5¾"
..	4-4-4	14' 11¾"	2	2½" x 2½" x ⅜"	6" x ¼"	11.3 lbs.	5¾"
..	3-6-3	14' 11¾"	2	2½" x 2½" x ⅜"	6" x ¼"	11.3 lbs.	5¾"
13	4-5-4	16' 1½"	2	2½" x 2½" x ⅜"	6" x ⅜"	12.03 lbs.	5¾"
..	5-3-5	16' 1½"	2	2½" x 2½" x ⅜"	6" x ⅜"	12.03 lbs.	5¾"
14	5-4-5	17' 3¾"	2	2½" x 2½" x ⅜"	6" x ¼"	13.3 lbs.	5¾"
..	4-6-4	17' 3¾"	2	2½" x 2½" x ⅜"	6" x ¼"	13.3 lbs.	5¾"
15	5-5-5	18' 6¾"	2	3" x 3" x ¼"	6" x ⅜"	13.6 lbs.	6¾"
..	6-3-6	18' 6¾"	2	3" x 3" x ¼"	6" x ⅜"	13.6 lbs.	6¾"
16	5-6-5	19' 8¾"	2	3" x 3" x ¼"	6" x ¼"	14.9 lbs.	6¾"
..	6-4-6	19' 8¾"	2	3" x 3" x ¼"	6" x ¼"	14.9 lbs.	6¾"
17	6-5-6	20' 11"	2	3" x 3" x ⅜"	6" x ⅜"	16.0 lbs.	6¾"
18	6-6-6	22' 1¾"	2	3" x 3" x ⅜"	6" x ¼"	17.3 lbs.	6¾"

Typical Details Showing Installation of Fenestra Units

Head Details

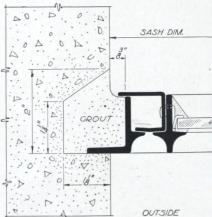


Detail No. 1

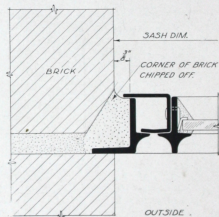


Detail No. 4

Jamb Details

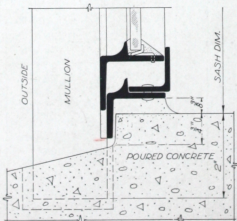


Detail No. 2



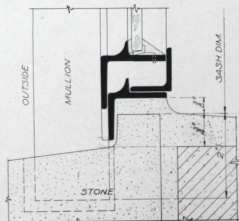
Detail No. 5

Sill Details



Detail No. 3A

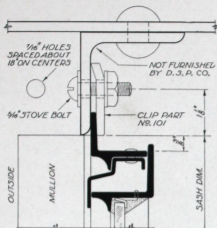
Installation in Concrete



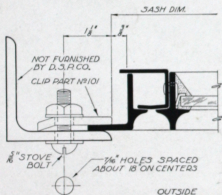
Detail No. 6A

Installation in Brick

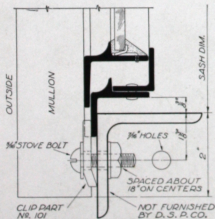
in Concrete, Brick and Steel



Detail No. 10



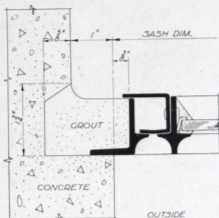
Detail No. 11



Detail No. 12

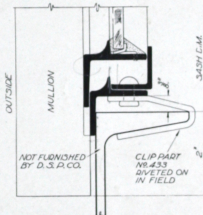
Installation in Steel

Other Details That May be Used



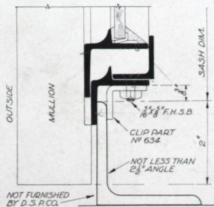
Jamb Detail No. 2A

Detail for Concrete Jamb for Installation of single Fenestra units. Also where Extension Butts and double connecting bars are required. Reveal should not be more than one inch.



Sill Detail No. 12A

Detail for channel I-beam or any steel sill section which cannot be easily punched in web of sections.



Sill Detail No. 12B

Detail for sill on horizontal mullions, transoms bars over doors, etc.

Fenestra

A few Fenestra installations where daylight



Standard units and mullions of Fenestra sash fill two bays 800 feet long and 14 feet high at the assembly plant of the Nordke and Marmion Company at Indianapolis, Ind. An abundance of daylight creates an atmosphere that builds quality into Marmion cars.

H. K. Ferguson Company
Engineers and Builders
Cleveland, Ohio

Daylighting 100%—That's the credit given the Fenestra WindowWalls by the Cleveland Chamber of Commerce, in the new factory building of the Globe Machine and Stamping Company of Cleveland, Ohio.

The bays are 15 feet wide and 8 feet, 6 $\frac{3}{4}$ inches high. Every square foot of floor space is productive.



Craig Curtis Company, Cleveland, Contractors
Paul S. Schmidt, Engineer



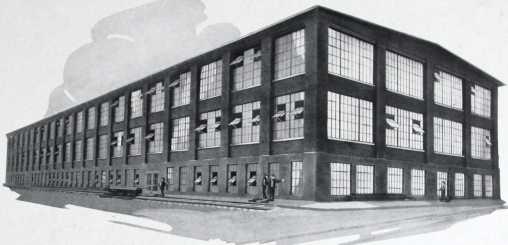
Hydra Construction Co.
Architects and Constructors
Buffalo, N. Y.

10,718 square feet of Fenestra WindowWall daily brings a flood of light and fresh air to increase the efficiency of the Köttinger Company, Inc., makers of high grade furniture at Buffalo, N. Y. Standard units of Z glass (14" x 20") fill all the bays.

Fenestra

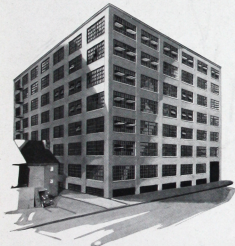
brightness encourages careful workmanship.

*J. R. Hampson & Co., Inc.
Contractors and Builders
Pittsfield, Mass.*



Fenestra standard sash plays a large part in making the Hollingsworth Mill of the W. E. Tillotson Mfg. Co., Pittsfield, Mass., "one of the finest textile mills of the country." 12,155 square feet of WindoWalls were used. The mill was completed in sixty-six working days.—Fenestra deliveries cause no delays.

The Sligh Furniture Company of Grand Rapids, Mich., substituted Fenestra sash a few years ago for antiquated wood sash, on one floor of their old building. This was an experiment. The answer is shown here, the recently completed addition to their plant. "Daylight will never really be appreciated until it goes up in price."



*Williamson, Cross & Proctor, Archts.
Grand Rapids, Mich.
Mastenbrook & Grove, Contractors
Grand Rapids, Mich.*



*A. C. Grievank
Chief Engineer*

"Better satisfied employees," "Increased output," "Reduced labor turnover," are the profitable features of Fenestra WindoWalls expressed by the general manager of the California Cotton Mills Company, Oakland, California. 25,000 square feet of Fenestra WindoWalls used.

